22.1 Producing Electric Current

A. When two conducting spheres touch, charges flow from a higher potential to a lower potential

1. Flow of charged particles = electric current

2. convential current (+) flows in opposite direction to electrons

B. Voltaic or galvanic cell (common dry cell) transforms chemical e ⟶ electrical e

1. Several galvanic cells = battery

II Electric circuits

A. Any closed loop or conducting path allowing electrical charges to flow = electrical current

B. Conservation of charge

1. charges cannot be created nor destroyed

III Rates of Charge Flow + Energy Transfer

A. Electric currents measured in coloumbs per second (C/s) → 1A

1. represented by I (amperage)

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Jan 1-5:04 PM

IV Diagramming Circuits (A)

A. AMmeter measures current, voltmeter measures potential difference (ΔV) → Figure 6 (p. 1414) for symbols

1. Ameter should be connected so curren goes through Ameter

B. Problem solving strategies (p. 1416) → steps 1-5

V Resistance and Ohm's Law: $R = \frac{\Delta V}{I}$

A. The measure of how strongly an object or material impedes current produced by a potential differen = resistance

B. A device having constant resistance independent of potential difference ob Ohm's law

C Wires used to connect electrical devic have resistance

1. 4 things affect resistance of a wi

a. length, cross-sectional area, tem and kind of metal

D. Controlling Current

1. Current can be controlled by two ways: varying ΔV and R → Figure 8, p 1421

E. Variable Resistors

1. A pentiometer is a variable resist used to obtain a smooth, continuous variation of current

VI Parallel and Series Connections

A. When a voltmeter is connected "acros another component" it is a parallel con between the voltmeter and circuit

1. Parallel connection - anytime the c has two or more paths to follow in

a. All access

Jan 3-1:08 PM

22.1 Review

Grade: 12th

Subject: Physics

Date: 1/7/13

Jan 1-5:04 PM

1 Ampere is a unit of _____.

A potential difference
B electric current
C potential energy
D power

$$I = \frac{\Delta V}{R}$$

Jan 4-8:53 AM

2 A battery can be used to convert _____ energy to electrical energy.

A electric current
B electrons
C chemical energy
D metal particles

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3 What will the ammeter read in a circuit where V = 24 V and R = 4 Ohms

A 12 A
B 24 A
C 4 A
D 6 A

Jan 4-9:00 AM

4 The words voltage across are associated with a _____ connection.

A parallel
B voltmeter
C series
D ammeter

Jan 4-9:01 AM

5 In a electric circuit diagram, the direction of current flow is _____.

A from the positive terminal
B from the negative terminal
C toward the resistor
D away from the resistor

Jan 4-9:03 AM

22.2 Electrical Energy in Use

I. Electrical Energy, Resistance, and Power

A. Energy supplied to a circuit can be transformed in many useful ways

B. Heating a resistor

1. Current moving through a resistor energy because flowing electrons bump into the atoms in the resistor

2. How much a resistor resists flow of current determines the amount of heat produced

1. Amount of heat possible to generate is determined by the power of the appliance

2. $P = I^2 \cdot R$

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C. Power and Thermal Energy

1. $P = \frac{(\Delta V)^2}{R}$

2. Total energy converted thermal energy can be written 3 ways:

$E = Pt$, $E = I^2 \cdot R \cdot t$, $E = (\frac{\Delta V^2}{R})t$

D. Superconductor - a material with zero resistance

II Providing Electrical Energy

A. To reduce energy lost to heat when transmitting energy long distances (from a dam), current (I) or resistance (R) must be reduced

1. Total increases with length of wire

B. Electric transmission lines

1. Wasted energy (electrical energy converted to thermal energy) is minimized by resistance being reduced

a. can be be achieved by using cables (wires) with high conductivity and large diameter

b. minimizing the current reduces waste (low amps = less waste)

2. Long-distance transmission lines always operate voltages higher than household voltages in order to reduce power (I^2R) loss

C. Kilowatt-hour = 1000 watts per hour to measure amounts of energy sold commercially

→ 1000W per 3600s(1h) or 3.6×10^6 J

Jan 8-1:01 PM

22.2 Review

Grade: 12th

Subject: Physics

Date: 1/8/13

Jan 8-11:27 AM

1 A heating coil has a resistance of 100 Ohms. It is designed to operate on 120 V. What is the power consumed by the heating coil (answer in Watts)?

$\frac{120^2}{100}$

144 Watts

Jan 8-11:33 AM

2 How much energy, in joules, does a 100-W lightbulb use in 20 s?

$E = P \cdot t$

$100 \cdot 20 = 2{,}000$

Jan 8-11:34 AM

3 Why are superconductors often impractical?

A they are too expensive
B they are too large for everyday use
C they must be kept at low temperatures
D there are no superconducting materials available today

Jan 8-11:36 AM

4 What is the unit of power that commerical energy companies use to measure energy sold?

A ohms
B kilowatt-hour
C joules
D amperes

Jan 8-11:37 AM

5 What is the thermal energy supplied in one minute by an appliance with a power dissipation of 1.2 kW (answer in kilojoules (kJ))?

$1.2\ kW \cdot 60\ s = 72\ kJ$

$1200\ W \cdot 60\ s = 72{,}000\ J$

Jan 8-11:39 AM